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ABSTRACT

This workbook, designed for workplace literacy courses, contains materials for a mathematics review course of basic number concepts focused on helping participants understand the meaning of numbers and arithmetic operations. Strategies are provided for increasing accuracy when doing computations with whole numbers, decimals, and percents. Rounding, estimating, and averaging is covered together with techniques for mental arithmetic. Applications to real work situations are used throughout with an emphasis on problem solving. Introductory materials include objectives, a topical outline, a course outline, information on course time and resources. The workbook contains lesson plans for 12 sessions (objectives, topics, method, evaluation, and materials needed), information sheets and problems to solve. The following topics are covered: place value, problem solving, mental arithmetic, division, rounding, estimating, averaging, decimals, fractions, planning and cost estimation, percent, quality control, job labor costs, personal money management, and employee benefits. A pretest and a posttest with answers are included. (KC)

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MERCER COUNTY COMMUNITY COLLEGE

TRENTON • NEW JERSEY

Math on the Job

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MATH ON THE JOB

Mercer County Community College
Division of Corporate and Community Programs
1200 Old Trenton Road
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Director, Workplace Skills

Prepared under a United States Department of Education
National Workplace Literacy Grant

1994

ACKNOWLEDGMENT

Mercer County Community College thanks Jean Meier, Senior Education Specialist/Curriculum Developer for creating this manual. Through her valuable contributions employees in manufacturing and service industries learned concepts relevant to their existing jobs and strategies for learning other tasks if that opportunity should arise.

MATH ON THE JOB

COURSE OUTLINE:

This course is a review of basic number concepts focused on helping participants understand the meaning of numbers and arithmetic operations. Strategies are provided for increasing accuracy when doing computations with whole numbers, decimals and percents. Rounding, estimating and averaging is covered together with techniques for mental arithmetic. Applications to real work situations are used throughout with an emphasis on problem solving.

OBJECTIVES:

Upon completion of this course, students will be able to:

- read and write whole numbers and decimals using a place value chart
- perform basic operations involving whole numbers and decimals
- round numbers and estimate
- perform mental arithmetic
- solve proportions
- calculate per cents
- apply number concepts in problem solving situations
- read and interpret charts and graphs

TOPICAL OUTLINE:

- place value
- computations with whole numbers
- mental arithmetic
- rounding
- estimating
- averaging
- computations with decimals
- ratio and proportion
- per cent concepts
- problem solving

MATH ON THE JOB

OTHER:

- Hours: 24
- CEU: 2.4

SOURCES:

Mitchell, Robert. *Math Skills that Work, Book One.* Chicago: Contemporary Books, 1991.

MATH ON THE JOB

COURSE OUTLINE:

Session 1

- Place value
- Problem solving on the job

Session 2

- Mental arithmetic
- Addition tips
- Multiplication by 2, 5, 10 and 100

Session 3

- Division short cuts
- Problem solving

Session 4

- Rounding
- Estimating
- Averaging

Session 5

- Understanding decimals
- Converting fractions to decimals

MATH ON THE JOB

Session 6

- Operations With Decimals
- Using decimals in job related situations

Session 7

- Planning and Cost Estimation

Session 8

- Understanding Per Cents
- Converting Fractions to Decimals to Per Cents
- Finding a Per Cent of a Number

Session 9

- Quality control

Session 10

- Job Labor Cards

Session 11

- Managing Your Money
- Employee Benefits

Session 12

- Evaluations
- Post test

MATH ON THE JOB ◆ SESSION 1

OBJECTIVES:

Upon completion of this session, students will be able to:

- assess their level of math anxiety
- discuss the meaning and appropriate use of different types numbers
- read and write whole numbers and decimals using a place value chart

TOPICS:

- math anxiety
- the appropriate use of different types of numbers in different contexts
- place value

METHOD:

- complete math anxiety self assessment
- discuss *Types of Numbers* handout
- complete *Place Value* handout

EVALUATION:

- self evaluation based on discussion of the work sheets
- pretest will be administered and graded so that progress can be assessed upon completion of the course

MATERIALS:

- handouts:
  - ◊ Math Anxiety
  - ◊ Types of Numbers
  - ◊ Place Value
- pretest

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MATH ON THE JOB ◆ PRETEST

1. You need 5,142 pamphlets. They are packed in 100's. How many full packs do you need? How many extra?

2. Add: 125 and 23.63 and 8.731

3. There are 5 errors found out of 100 line items checked. What is the error rate (%) ?

4. In the number 39.1852 what place is the 8 in?

   a. tenths b. hundredths c. thousandths d. ones

5. A large shipment of 150 cartons is received. There is an average of 485 pieces per carton. How many pieces are in the entire shipment?

6. Write $1\frac{3}{4}$ as a decimal.

7. Round $7.69 to the nearest dollar.

8. If there are 6000 pieces with 600 in a box, how many boxes are there?

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MATH ON THE JOB ◆ PRETEST

9. A shipment is received and 10 boxes are counted as follows:

Box #	Number of Pieces
1	370
2	400
3	390
4	420
5	400
6	360
7	380
8	430
9	420
10	410

What is the average count per box?

10. When you are counting materials you are allowed an error rate of 1%. If you counted 200 brochures you might be off by how many brochures?

11. In one seven and a half hour day 400 line items were picked and sorted. How many lines per hour is that?

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MATH ON THE JOB ◆ PRETEST

12. A package to be mailed is weighed and found to weigh 1 lb. 6 oz. If it is being sent to zone 2 what should the postage be? Use the chart below.

Weight Not to Exceed (Pounds)	Local	Zones 1 & 2	3
1.5	.93	1.27	1.30
2.0	.94	1.30	1.34

13. Calculate 600,000 ÷ 20,000.

14. On the average 250 brochures can be inserted into envelopes in one hour. How many would be inserted in two and a half hours?

15. In a particular year your company makes a 5% profit. Out of $500,000 how much would be profit?

16. A scale weighs an empty box at 4.2 pounds. The box weighs 30 pounds when it is filled. What is the weight of the contents?

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MATH ON THE JOB ◆ PRETEST

17. A postage meter shows that it will cost $103.57 to mail notices to companies. If there is a credit of $258.60 in that account, how much credit will be left after the order is sent?

18. A skid is piled with large posters. Some of them are hand counted and there are found to be 200 posters per inch. If the stack of posters is 2 feet high, how many posters are there?

19. Is .66% error more or less than 1%?

20. Round 127 to the nearest hundred.

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PRE/POST TEST KEY

1. 51 full packs 42 extra
2. 157.361
3. 5%
4. B
5. 72,750
6. 1.75
7. $8
8. 10
9. 398
10. 2
11. 53.3
12. $1.27
13. 30
14. 625
15. $25,000
16. 25.8 pounds
17. 155.03
18. 4800
19. less
20. 100

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TYPES OF NUMBERS

We are all surrounded by numbers on the job and at home. Do you recognize the following numbers? Where do you think you would see each one? (in what context?)

- $8\frac{1}{2}$ x 11
- $\frac{1}{2}$ of #1
- $1.25\frac{9}{10}$
- 11.30
- 11.3
- 11:30
- 15:00
- 180°
- 90°
- .44%
- 125 lb. per square foot

What are whole numbers? What kinds of numbers are not "whole"?

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MATH ANXIETY

Self Assessment/ Self Awareness Inventory

Please respond to the following statements on a scale from 1 to 5:

Not Like Me	Somewhat Like Me	Occasionally Like Me	Usually Like Me	Very Much Like Me
1	2	3	4	5

1. Other people usually think of me as being good with numbers.
2. When doing arithmetic I usually feel confident I'll do it right.
3. Everyone around me understands more about math than I do.
4. I ask a lot of questions when I don't understand something to do with numbers.
5. I would rather have a job that didn't require any arithmetic.
6. Learning math means learning rules that I don't understand.
7. I'm scared that others will find out that I really don't know how to calculate things that I should be able to.
8. I feel sure I can learn how to do arithmetic if someone explains it to me.
9. My ways of working out math problems are different than the methods most everyone else uses.
10. I enjoy explaining to others who are new on the job how to do all the necessary calculations.

- ◊ What's your best experience in a math class?
- ◊ What's your worst experience in a math class?

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PLACE VALUE

Our number system is called a *decimal* number system. The prefix *deci-* means ten.

hundreds	tens	ones	.	tenths	hundredths	thousandths	
1	0	0					one hundred
	1	0					one ten
		1					one whole
				.1			one tenth
				.0	1		one hundredth

How many hundreds in the following numbers? How many left over?

- 5120
- 17,543
- 462
- 3456

How many 10's in the following numbers? How many left over?

- 2670
- 34,600
- 965
- 670

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PLACE VALUE

Fill in the names of each place in the place value chart below:

____ ____ ____ ____ ____ ____ ____ ____ . ____ ____

Write the following numbers:

- thirty-seven million, four hundred two
- five hundred seven thousand
- fifty-seven thousand
- 8.5 million
- five billion, twenty-four million, fifty-two
- 4 trillion dollars

If you made a yearly salary of $100,000 how long would it take you to earn 4 trillion dollars?

How many 25's in the following numbers?

- 100
- 400
- 900
- 830
- 1000
- 2100
- 5000

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MATH ON THE JOB ◆ SESSION 2

OBJECTIVES:

Upon completion of this session, students will be able to:

- use addition short cuts
- use multiplication tips to speed mental arithmetic
- multiply by 10, 100, 1000

TOPICS:

- addition short cuts
- multiplication tips

METHOD:

- discussion of worksheets
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Addition/Subtraction Short Cuts
  - ◊ Multiplication Tips

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ADDITION/SUBTRACTION SHORT CUTS

Often it is necessary to quickly add or subtract numbers in your head when estimating or checking to see if quantities are about what they should be.

Example: Add 400 + 700 + 600 + 500 =

Think 1000 + 1200 = 2,200

Example: Add 7,000 + 6,000 + 2,000 =

Think 9,000 + 6,000 = 16,000 - 1,000 = 15,000

Are there other methods that you use to make addition or subtraction simpler? For example, try the following problems without using paper or a calculator.

1. For a certain item there were 1976 pieces on the shelf. You used 38. How many were left?

   See if you can write down the method you used to get the answer.

2. The shelf has 3798 flyers and 800 posters. How many more flyers are there than posters?

3. You need 4,035 brochures. There are 600 on hand. How many are you short?

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MULTIPLICATION TIPS FOR WHOLE NUMBERS

To multiply numbers that end in zero:

- **First, multiply the non-user digits**
- **Second, follow the answer with the number of zeros in the two numbers**

Example: 2,300 X 20 = ?
23 X 2 = 46
Therefore, 2,300 X 20 = 46,000
(3 zeros total) (3 zeros)

Example: 45 X 100 = ?
45 X 1 = 45
45 X 100 = 4500

To multiply by five:

- **First, multiply by 10**
- **Take half of your answer**

Example: 5 X 42 = ?
Think: 10 X 42 = 420
Therefore 5 X 4[illegible] = 210

Example: Try both of the following problems. Which is easier to do?

5 X 7 X 8 = 5 X 8 X 7 =

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Location	Number of Shrink Wrapped Packs	Number of Items in Each Pack	Total Number of Individual Items
C2S6800503A	900	10	
C2S7102801B	152	100	
C2S7300802E	84	25	
C2S7301201B	5000	50	
C2S7301202A	472	50	
C2S7301201C	1000	25	
C1S0602B010	16,235	100	
C 1NB 091030	98,000	10	
C1S06030010	3000	25	
C 1NB 085030	500	100	
C1S06021020	532	10	

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MULTIPLICATION TIPS

- **Break down using *multiplication***

  Example: 15 X 22 = ?

  Think: 3 X 5 X 2 X 11

  33 X 10

  330

- **Break down using *addition***

  Example: 15 X 80 = ?

  Think: (10 + 5) X 80

  10 X 80 + 5 X 80

  800 + 400

  1200

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MATH ON THE JOB ◆ SESSION 3

OBJECTIVES:

Upon completion of this session, students will be able to:

- use division short cuts
- use the appropriate operation in problem solving situations

TOPICS:

- division tips
- problem solving

METHOD:

- discussion of worksheets
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Dividing Numbers Ending in Zero
  - ◊ Problem Solving

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PROBLEM SOLVING

Problem solving often requires one operation or a combination of operations. You must decide which operation to use

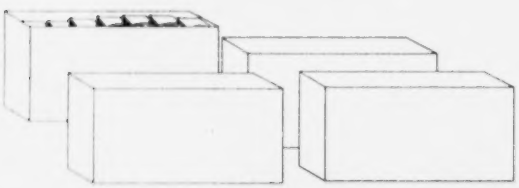
I. You have 23 folders. They are to be packed in boxes with 5 in each box. How many full boxes will you have? How many left over?

23 altogether
split up into separate boxes

[redacted]

When you *know the total* amount and you are *cutting it up* use division. *Divide* to determine the number of groups or the number in each group

II. A shipment of books arrives. There are 4 cartons with 7 books in each carton. How many are there altogether?



7 in one box
how many are there altogether?

[redacted]

If you *know* the number in *one* box and you *want* to know how much you have in *many boxes,* you should multiply.

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PROBLEM SOLVING

I. Define the problem.

- What are you trying to find out?

II. Plan the solution.

- What data is needed?
- What operations should be used?
- Use estimation to approximate the answer.

II. Solve the problem.

- Set up the calculations properly.
- Watch for copying errors.
- Check for calculator mistakes.

III. Check to see if the answer is reasonable.

- Does your answer fit with your initial estimate?
- Did you answer the question that was asked?

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DIVIDING NUMBERS ENDING IN ZERO

There are several different ways to show division:

$150 \div 50$ $\qquad$ $\frac{150}{50}$ $\qquad$ $50\overline{)150}$

Division is often easier when using numbers that end in zero.

Try the following problems using a calculator:

1.) $\frac{4000}{20}$ $\qquad$ 2.) $\frac{5000}{50}$

3.) $\frac{400}{2}$ $\qquad$ 4.) $\frac{500}{5}$

Now try these problems without using a calculator:

5.) $\frac{150}{50}$ $\qquad$ 6.) $\frac{5100}{10}$

7.) $\frac{300}{30}$ $\qquad$ 8.) $\frac{5100}{20}$

9.) $\frac{3150}{10}$ $\qquad$ 10.) $\frac{4160}{40}$

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Pick List Pick Quantity	Actual Amount of Stock # Items per Carton	 # Cartons Needed
1800	40	
4760	20	
640	10	
1084	100	
6000	50	
16,860	100	
14,210	70	
120,000	40	

For the problems below, circle your answer choice:

1. Enough pages need to be collated and stapled to make a total of 4,000 packages of materials. If 50 can be done in one hour, how many total hours will be needed?
   a) 8 hours
   b) 80 hours
   c) 800 hours

2. There are 360 boxes altogether. On a skid there are 5 cartons to a row stacked 4 rows high. How many skids are necessary?
   a) 2 skids
   b) 20 skids
   c) 80 skids

3. A total of 50,000 individual pieces are needed. If they are shrink wrapped in 50's how many shrink wrapped packs are needed?
   a) 10
   b) 100
   c) 1000

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DIVIDING BY 10, 100 AND 1000

Try the following problems on your calculator. Then make up a few problems of your own.

1.) $4500 \div 10$

2.) $100\overline{)4500}$

3.) $\frac{4500}{1000}$

4.) $492 \div 10$

5.) $492 \div 100$

6.)

7.)

8.)

9.)

10.)

Do you see any possible shortcuts?

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MATH ON THE JOB

1. Given 6000 pieces with 600 in a box, how many boxes are there?

2. If there are 30 boxes of brochures with 100 in a box, how many brochures are there?

3. The warehouse had 120,000 calendars of which 60,000 were used. How many were left?

4. Given 387 red pens and 492 blue pens, what is the total number of pens? Estimate your answer first then give an exact answer.

5. Twenty boxes were used to pack 200 computer books. How many books were packed in each box?

6. There are 480 boxes altogether. On a skid there are 8 cartons to a row and they are stacked 5 high. How many skids are necessary?

7. Evelyn needs legal pads to last eight weeks. Her department uses fifty pads per week. Legal pads come in packages of ten. How many packages does she need?

8. A total of 284 pieces are needed. They come packed 25 to a box. How many boxes do you need?

9. A total of 398,000 pieces are needed. They come packed 100 to a box. How many boxes are needed?

10. The shelf has 2598 reams of white paper and 600 reams of yellow paper. How much more white paper is there than yellow paper? Estimate your answer first, then get an exact answer.

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MATH ON THE JOB ◆ SESSION 4

OBJECTIVES:

Upon completion of this session, students will be able to:

- round whole numbers
- use estimation
- find an average

TOPICS:

- rounding
- estimation with whole numbers
- using estimation to find stock discrepancies
- averaging

METHOD:

- guided discussion
- groupwork
- completion of worksheets

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Rounding
  - ◊ Estimation
  - ◊ Averaging

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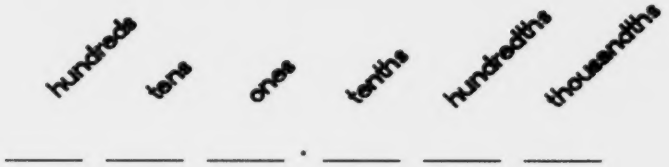
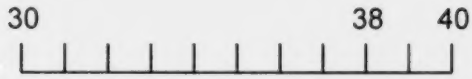
ROUNDING

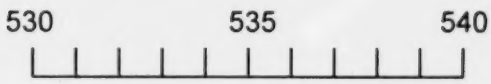


Round 38 to the nearest ten:



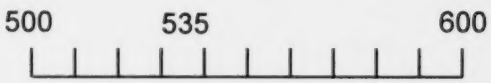
38 is closer to 40
round *up*

Round 535 to the nearest ten:



535 is halfway
round *up*

Round 535 to the nearest hundred:



535 is closer to 500
round *down*

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ESTIMATION

Estimation is used in any situation where an exact answer is not required. Often, if a mistake has been made an estimate will help you catch it.

To estimate:

1. **Round off the numbers.**

2. **Do any arithmetic required with the rounded off numbers.**

See how quickly you can find any computer mistakes in the stock quantities listed below. Use estimation.

Pick List	**Actual Amount of Stock Left on Shelf**	
QTY. AVAIL.	**# Cartons**	**# Items per Carton**
1845	41	45
475	19	25
640	12	40
1084	59	12
5901	59	100
686	49	14
1424	68	25
801	30	30

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ESTIMATION

See how quickly you can determine the number of cartons needed. Use estimation.

Pick List	**Amount of Stock**	
Pick Quantity	**# Items per Carton**	**# Cartons Needed**
1622	40	
582	19	
357	11	
9295	100	
9295	50	
6,861	25	
14,240	68	
95,471	30	
45,791	500	
652	45	

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MATH ON THE JOB ◆ SESSION 5

OBJECTIVES:

Upon completion of this session, students will be able to:

- read and write decimals using a place value chart
- express common fractions as decimals
- round decimals

TOPICS:

- place value of decimals
- converting fractions to decimals
- rounding decimals

METHOD:

- lecture
- discussion
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Understanding Decimals
  - ◊ Converting Fractions to Decimals

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DECIMAL FRACTIONS

To read a decimal fraction, read the number as a whole number, then say the name of the place value where the last digit falls.

The following three numbers all have the same value:

0.5 is read as 5 tenths

0.50 is read as 50 hundredths

0.500 is read as 500 thousandths

The value of a number is determined by its place or location compared to the *decimal point*. A number has many different values depending on which place it is in.

Circle the largest number in each pair:

.1	.01
.6	.60
.6	.09

The decimal point is usually not written in whole numbers but it can be put in. Where is the decimal point understood to be in the number 592?

What is half of .1?

What is twice as big as .8 ?

How much money would .8 represent?

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CONVERTING FRACTIONS TO DECIMALS

Why are these coins called quarters?

How many are in one dollar?

One quarter is written $\frac{1}{4}$ or $.25

$\frac{1}{4}$ also means 1 out of 4

or $1 \div 4$

or $4\overline{)1.00}$

[redacted]

One half dollar is written $\frac{1}{2}$ or $.50

There are 10 dimes in a dollar therefore a **dime** would be written:

$$\frac{1}{10} \text{ or } \$.10$$

There are 20 nickels in a dollar therefore a **nickel** would be written:

_____ or _____
fraction decimal

There are 100 pennies in a dollar therefore a **penny** would be written:

_____ or _____
fraction decimal

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CONVERTING FRACTIONS TO DECIMALS

Express Common Fractions as Decimal Fractions

To express a common fraction as a decimal fraction requires division of the numerator by the denominator.

With repeating decimals, the division should be carried out one more place than the number of places required in the answer, then rounded.

Example: express $\frac{5}{7}$ as a 2 place decimal

$$\frac{5}{7} = 5 \div 7 = 7\overline{)5.000}\ \begin{matrix}.714\end{matrix} = .71$$

Express Decimal Fractions as Common Fractions

Read the place value of the last digit.

Example:

$$0.357 = \frac{357}{1000}$$

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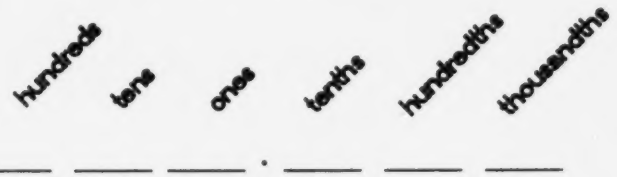
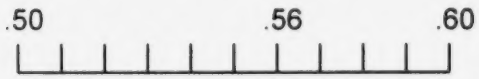
ROUNDING



Round .56 to the nearest tenth:



.56 is closer to .6
round *up*

To round a decimal fraction, determine the number of decimal places required,

- if the digit to the right of this decimal place is less that 5, eliminate all the digits following it.

  e.g. round 5.318 to the nearest tenth

  5.318 = 5.3

- if the digit to the right of this decimal place is 5 or more, add one to the last required digit and eliminate all the digits following it.

  e.g. round 5.318 to the nearest hundredth

  5.318 = 5.32

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MATH ON THE JOB ◆ SESSION 6

OBJECTIVES:

Upon completion of this session, students will be able to:

- add and subtract decimals
- multiply and divide decimals
- use decimals in problem solving situations

TOPICS:

- arithmetic operations with decimals
- problem solving

METHOD:

- lecture
- discussion of worksheets
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Working With Decimals

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USING DECIMALS

There are shortcuts you can use when multiplying decimals by 10, 100 and 1000. To multiply a decimal by 10, move the decimal point **one place to the right.**

EXAMPLE: **5.879 X 10 = 58.79**

Now try multiplying by 100 and 1000. What happens to the decimal point?

5.879 X 100 = **5.879 X 1000 =**

Now try dividing. What happens to the decimal point?

35.465 ÷ 10 = **35.465 ÷ 100 =** **35.465 ÷ 1000 =**

1. 5.1 x 10 = _____
2. 3.27 ÷ 100 = _____
3. 5.8 ÷ 20 = _____
4. 4.5 x 100 = _____
5. 3.25 ÷ 10 = _____
6. 4.7 x 100 = _____
7. 3.875 x 100 = _____
8. 3.21 x 20 = 41

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USING DECIMALS

9. A scale shows that several different packages of brochures weigh the following amounts:
   23 pounds 27.5 pounds 21.75 pounds

   What is the total weight?

10. A forklift can safely lift and move five thousand pounds. There are already boxes weighing 105.5 pounds, 300 pounds and 3 thousand pounds on the lift. How much more weight can be added?

11. A package is to be mailed to zone 3. It weighs 1 lb. 7 oz. Use the chart shown to determine the postal rate:

Weight (lbs.) not exceeding	ZONES			
	Local	1 & 2	3	4
1.0	.92	1.24	1.26	1.30
1.5	.93	1.27	1.30	1.36
2.0	.94	1.30	1.34	1.42

12. Four hundred line items were picked and sorted in a seven and a half hour day. How many lines per hour is that?

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ADDING AND SUBTRACTING DECIMAL FRACTIONS

Addition/Subtractions Skills

- add/subtract decimals, mixed decimals and whole numbers

To add decimal fractions:

1) arrange the numbers so that the decimal points are directly under each other,

2) add, as with whole numbers and

3) place the decimal point in the answer directly under the other decimal points.

e.g. Add 5 + .02 Subtract 3.07 - .005

5.	3.070
+ .02	- .005
5.02	3.065

Note: To reduce the possibility of error, place zeros in all place values which have no digits.

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MULTIPLICATION AND DIVISION SKILLS

Multiplication and Division Skills

- multiply and divide decimals, mixed decimals, and whole numbers

Multiplying Decimal Numbers

To multiply decimals, multiply using the same procedure as with whole numbers. Place the decimal point in the answer the same number of decimal places as there are in both numbers being multiplied.

e.g.

	50.123	(3 places)
x	0.87	(2 places)
	43.60701	(5 places)

Dividing Decimal Numbers

To divide decimal fractions, (1) move the decimal point of the divisor as many places to the right as are necessary to make the divisor a whole number, (2) move the decimal point in the dividend the same number of places as were moved in the divisor, (3) place the decimal point in the quotient directly above the decimal point in the dividend, (4) add zeros to the dividend if necessary, and (5) divide as with whole numbers. Round as required.

e.g. Divide 0.643 by 0.28. Round to 3 decimal places

$$\begin{array}{r} 2.2964 \\ .28\overline{)0.643000} \end{array} \approx 2.296$$

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MATH ON THE JOB ◆ SESSION 7

OBJECTIVES:

Upon completion of this session, students will be able to:

- use decimal time
- use ratios and proportions

TOPICS:

- ratios
- proportions
- decimal time
- completing a direct mail estimate

METHOD:

- lecture
- discussion of worksheets
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Direct Mail Estimate

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DIRECT MAIL ESTIMATE

JOB: Brochure into 9 X 12 envelope. Mail 1st class. 500 envelopes to be inserted.

Step	Time	Unit Cost	Cost
Unload Stock From Truck Move Stock Into Warehouse	30 min.	$3/hour	_____
Transfer Stock From Warehouse Into Assembly	20 min.	$5/hour	_____
Set Up Brochures and Envelopes Onto Work Tables	20 min.	$3/hour	_____
Pick Up Brochures and Insert Into Envelopes	250/hour	$10/hour	_____
Label Envelopes	300/hour	$12/hour	_____
Seal and Meter Envelopes	500/hour	$12/hour	_____
Transport Envelopes to Post Office	30 min.	$3/hour	
TOTALS	_____		_____

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DIRECT MAIL ESTIMATE

1. If it takes 30 minutes to unload 500 brochures how many would be unloaded in 1 minute? in 5 minutes? in 10 minutes? in 1 hour?

2. If the envelopes can be labeled at the rate of 300 per hour how many would be labeled in 1 minute? in 5 minutes? in 10 minutes? in 30 min.?

3. Why is this called an *estimate*?

4. Find the total time for this job.

5. Find the cost for each step and for the total job.

6. Are these estimates realistic? Which steps do you think might take a longer time? Calculate any increased cost.

7. Which steps could be done in a shorter time? Calculate the amount of money saved.

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MATH ON THE JOB ◆ SESSION 8

OBJECTIVES:

Upon completion of this session, students will be able to:

- convert fractions to decimals to percents
- calculate a percent of a number
- draw a bar graph

TOPICS:

- understanding percents
- discussing the cost of doing business at the company
- reading and understanding bar graphs

METHOD:

- discussion of worksheets
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ The Cost of Doing Business at An operation

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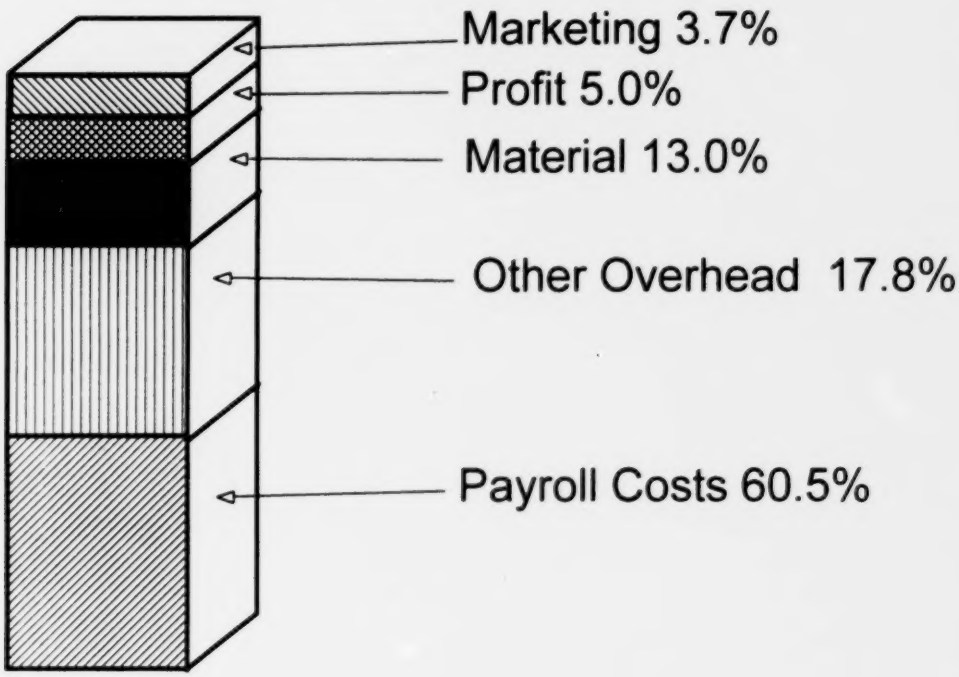
PER CENTS



1. What does the above diagram show you?

2. The artist who drew the picture made a mistake. Can you tell him what's wrong?

3. Use graph paper to draw the picture correctly.

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PER CENTS

4. What do all the percentages add up to?

5. What does the word *overhead* mean? List some things that might be included in overhead.

6. **Per cent** means per hundred.

   This operation makes 5% profit.

   5% means $5.00 out of every $100.

   or _____ out of every $1

   To get this answer you had to DIVIDE by _____

   There is a shortcut way to do this division. What is the shortcut?

   If this operation takes in $500,000 how much would be profit?

6. Out of that same $500,000 how much would go to cover:

   - marketing?
   - material?
   - overhead?
   - payroll?

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MATH ON THE JOB ◆ SESSION 9

OBJECTIVES:

Upon completion of this session, students will be able to:

- find what percent one number is of another number
- use decimals and percents in problem solving situations

TOPICS:

- calculating percent
- problem solving
- quality control at a company

METHOD:

- lecture
- discussion of worksheets
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts:
  - ◊ Weekly Quality Report

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MATH ON THE JOB ◆ SESSION 10

OBJECTIVES:

Upon completion of this session, students will be able to:

- change hours to military time
- change hours/minutes to decimal time
- complete a job labor card
- understand flextime

TOPICS:

- military time
- decimal time
- job labor card
- problem solving using flextime memo

METHOD:

- discussion
- groupwork

EVALUATION:

- self evaluation based on discussion of the work sheets

MATERIALS:

- handouts

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WEEKLY TIME SHEET

You worked the following hours last week:

	Begin	End
Monday	8:00 A.M.	3:30 P.M.
Tuesday	8:00 A.M.	5:30 P.M.
Wednesday	8:00 A.M.	4:00 P.M.
Thursday	8:30 A.M.	4:00 P.M.
Friday	9:30 A.M.	5:30 P.M.
Saturday	7:30 A.M.	3:00 P.M.

1. Change all the times to military time.

2. Calculate the number of hours worked. Use decimal time.

3. Calculate the overtime worked on weekdays

4. Calculate the overtime worked on Saturday

5. Calculate your weekly paycheck assuming that you made $10 per hour.

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FLEXTIME

XYZ Operation has a policy of flextime. Below is a memo written by the Manager of Human Resources telling employees about the program.

To: All Employees
From: Manager, Human Resources
Subject: Flextime

We are about to initiate a new policy of flextime at XYZ. Beginning March 1, 1993 you will be able to be more flexible about your start and finish times. You have to be at work between the core hours of 10 a.m. to 3 p.m. and you must be present for seven and a half hours. This means that, for example, you could come in at 6 a.m. and then leave by 2:30 p.m. Or, if you wanted to come in at 9:30 a.m. it would mean that you could leave at 5:00 p.m. You can even come in at different times on different days. You do, however, need to get your supervisor's permission. The telephones must be covered between the hours of 9 a.m. to 5 p.m.

1. Is the flextime policy clear to you after reading this memo? Write down any questions you have for the Human Resource Manager.

2. List at least two more possible start and finish times.

3. Explain how you calculated these start and finish times.

4. Rewrite the memo. Try to make it more understandable. Change all the times to military time. What is the advantage of using military time?

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MATH ON THE JOB ◆ SESSION 11

OBJECTIVES:

Upon completion of this session, students will be able to:

- read a pay check
- calculate medical benefits

TOPICS:

- reading a pay check
- reading a medical benefits booklet

METHOD:

- discussion
- completion of worksheets

EVALUATION:

- self evaluation based on worksheets

MATERIALS:

- handouts

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MEMO

To: All employees

From: Personnel

Subject: Medical Insurance

Over the last several months we have been researching alternative medical plans and we are pleased to announce that we will be offering a new plan beginning January 1, 1994.

The plan will allow you to decide at the point of service whether you would like to seek care with a preferred provider, and receive a higher level of benefits, or choose a non-preferred provider and receive a lower level of benefits.

Employee contributions to the new plan will be as follows:

Single	$28.50 per month	Family	$82.94 per month
Parent/Children	$51.17 per month	Husband/Wife	$60.28 per month

We are anticipating that all rates will increase 10% within the next year. At that time all employees will be notified of the appropriate changes.

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CALCULATE MEDICAL BENEFITS

Study the memo on medical insurance and see if you can answer the following questions about it:

1A. If you are a single parent with a child what will you pay per month?

1B. If you receive a paycheck on the 15th and 30th of each month how much would be taken out of each paycheck for each option?

1C. How much would be taken out each year?

2A. Last year you had 2 visits to the emergency room ($300 each). You had 20 doctor visits after that ($100 each) and one visit to a specialist ($250). If you are single how much would you have paid for medical care if you stayed within the network?

2B. For the same visits as above what would you have paid if you went outside the network?

3. If you are single, how much extra money would you have to spend after the rates go up?

4. If you buy family coverage, how much extra money would you have to spend after the rates go up?

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SUMMARY OF PROPOSED MEDICAL BENEFITS

Plan features	Preferred Benefits	Non-Preferred Benefits
Deductible	None	$250 Individual $750 Family every contract year
Office Visits	$5 copay	70%
Routine Physical	$5 copay	Not covered
Routine Eye or Hearing Exam	$5 copay	Not covered
Routine Mammography	$5 copay	Not covered
Specialist	$5 copay	70%
Hospital Inpatient	$100 copay per confinement	70% after $250 deductible per confinement and contract year deductible
Emergency Room	$25 copay	$25 deductible
Hospital Surgery	100%	70%
Skilled Nursing Facility	100%	70%
Home Health Care	100%	70% up to 120 visits per contract year

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PAYCHECK

GROSS PAY **OTHER DEDUCTIONS**

Description	Hours	Amount	Description	Amount	YTD Amount	**Empl. No.** 20331
Regular	40.00	8.90	Unemp-Tax	15.30	76.50	**Soc. Sec. #** 124-55-3385
			Medical	14.53	72.65	**Week Ending** 2/4/94
			401K Invst.	9.48	47.40	**Check Date** 2/9/94
Gross Wage		356.00			1780.00	**Check No.** 7364

CURRENT INFORMATION

Gross Pay	Fed. W/H Tax	F.I.C.A.	State Tax	City/ County Tax	Total Other Deduct.	**NET PAY**
356.00	89.75	31.78	14.93	N/A	39.91	179.63
1780.00	448.75	158.90	74.65	N/A	196.55	901.15

YEAR TO DATE

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PAYCHECK

GROSS PAY	OTHER DEDUCTIONS

Description	Hours	Amount	Description	Amount	YTD Amount	Empl. No.
Regular			Unemp-Tax			Soc. Sec. #
			Medical			Week Ending
			401K Invst.			Check Date
Gross Wage						Check No.

CURRENT INFORMATION

Gross Pay	Fed. W/H Tax	F.I.C.A.	State Tax	City/ County Tax	Total Other Deduct.	NET PAY

YEAR TO DATE

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PAYCHECK

This is a **sample paycheck stub** but as you can see, not all of the information is on the check. Look at the information provided about this employee and write it in the paycheck stub in the correct places.

- $ This paycheck belongs to **Karen Hopkins.** Karen's social security number is 223-57-8694. Her employee number is 20344.

- $ This week, Karen worked her regular 40 hours per week. Her gross wage is 8.75 per hour. What would her gross total week's pay be?

- $ So far this year, Karen's gross income is $5600.

- $ The check number is 7387.

- $ The company takes out for unemployment tax and this week they took out $11.24. So far this year, they have taken out $179.84.

- $ The pay week ends 4/23/93. The check will be dated for a week later.

- $ For Medical insurance, the company takes out $21.15 for each paycheck, and so far this year has taken out $338.40.

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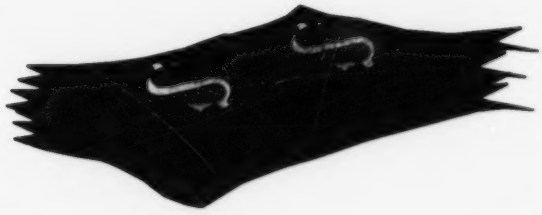
PAYCHECK



$ Karen has a 401K Investment through the company, also. This check they took out $43.66. So far this year Karen has set aside $698.56 into that investment.

$ The Federal Government withholds $57.89 from every one of Karen's paychecks. They have withheld $926.24 so far this year.

$ Karen has money taken out for Social Security. This paycheck they took out $20.34 so far. So far this year they have taken out $325.44.

$ The State also takes out taxes from Karen's check. Every week they take out $12.01. So far this year they have taken out $192.16.

$ $ BONUS questions of the day !!!! $ $

$ What was the *total* of her **deductions**?

$ What was Karen's **NET PAY** for this paycheck?

$ This is week 16 of the year. What is Karen's **NET PAY** *for the year so far*?

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MATH ON THE JOB ◆ SESSION 12

OBJECTIVES:

Upon completion of this session, students will be able to:

- evaluate their progress in the course
- evaluate the course

TOPICS:

- class evaluations
- post test

METHOD:

- completion of evaluation sheets
- completion of the post test

EVALUATION:

- grade on the post test

MATERIALS:

- class evaluation sheets
- post test (same as pretest)

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MATH ON THE JOB ◆ POST-TEST

1. You need 5,142 pamphlets. They are packed in 100's. How many full packs do you need? How many extra?

2. Add: 125 and 23.63 and 8.731

3. There are 5 errors found out of 100 line items checked. What is the error rate (%) ?

4. In the number 39.1852 what place is the 8 in?

   a. tenths b. hundredths c. thousandths d. ones

5. A large shipment of 150 cartons is received. There is an average of 485 pieces per carton. How many pieces are in the entire shipment?

6. Write $1\frac{3}{4}$ as a decimal.

7. Round $7.69 to the nearest dollar.

8. If there are 6000 pieces with 600 in a box, how many boxes are there?

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MATH ON THE JOB ◆ PRETEST

9. A shipment is received and 10 boxes are counted as follows:

Box #	Number of Pieces
1	370
2	400
3	390
4	420
5	400
6	360
7	380
8	430
9	420
10	410

What is the average count per box?

10. When you are counting materials you are allowed an error rate of 1%. If you counted 200 brochures you might be off by how many brochures?

11. In one seven and a half hour day 400 line items were picked and sorted. How many lines per hour is that?

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MATH ON THE JOB ◆ PRETEST

12. A package to be mailed is weighed and found to weigh 1 lb. 6 oz. If it is being sent to zone 2 what should the postage be? Use the chart below.

Weight Not to Exceed (Pounds)	Local	Zones 1 & 2	3
1.5	.93	1.27	1.30
2.0	.94	1.30	1.34

13. Calculate 600,000 ÷ 20,000.

14. On the average 250 brochures can be inserted into envelopes in one hour. How many would be inserted in two and a half hours?

15. In a particular year your company makes a 5% profit. Out of $500,000 how much would be profit?

16. A scale weighs an empty box at 4.2 pounds. The box weighs 30 pounds when it is filled. What is the weight of the contents?

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MATH ON THE JOB ◆ PRETEST

17. A postage meter shows that it will cost $103.57 to mail notices to companies. If there is a credit of $258.60 in that account, how much credit will be left after the order is sent?

18. A skid is piled with large posters. Some of them are hand counted and there are found to be 200 posters per inch. If the stack of posters is 2 feet high, how many posters are there?

19. Is .66% error more or less than 1%?

20. Round 127 to the nearest hundred.

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